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DETONATION OF TABLETS COMPOSED OF CHLORATE OF POTASSIUM AND CHLORIDE OF AMMONIUM.

By Charles Bullock.

The mixture of the above mentioned salts, which has been in use for some time as a popular remedy for mouth and throat affections, has been viewed with suspicion, as a probable source of mischief on account of the decomposition resulting between them.

After a few weeks, chlorine compounds are evolved, noticeable by the odor, and by the effect on the organic material which may be in contact with or near them.

If the quantity of the tablets is large, sufficient heat may be generated to cause spontaneous combustion, should circumstances favor it.

We had a new experience with them, a few days since. A lot of the tablets, more than a year old, were removed from the small bottles in which they are usually put up, and four ounces of them placed in one bottle and finished for delivery. While standing undisturbed, a loud explosion occurred, and the bottle containing the tablets was almost pulverized—the concussion breaking several other bottles in proximity, although they were protected by pasteboard cases.

The cause of the detonation may be looked for in the formation of chloride of nitrogen, as one of the resultants of decomposition between the salts. This experience determined us to deposit the remainder of our stock of the tablets in the Delaware River for *safe* keeping!

RESIN OF PODOPHYLLUM AND PODOPHYLLIN.

J. U. LLOYD.

(Continued from p. 245.)

The Name.—In early contributions 1844 and 1846, concerning plant products employed in his practice under the name Eclectic preparations,[1] Prof. John King first, as before stated (see p. 242) described the substance now known as resin of podophyllum. He affixed the term *resin*, to this as well as to other similar bodies therein mentioned, obtained by evaporation of an alcoholic tincture and precipitation in water, specifying such American drugs as Cimicifuga racemosa, Iris versicolor, etc. Prof. King, however, a practitioner of medicine, was not in position to place such substances before the profession, and this by his solicitation with resin of podophyllum was accomplished by the late W. S. Merrell of Cincinnati, a fact supported by Prof. King[2] as well as by unwritten information at my command.

During the considerable period that intervened between its discovery (1835) and its practical introduction (1846) as a remedy, the only name applied to it in journal communications had been "resin of podophyllum," which, as before shown, originated with King[3]. However, upon placing the drug before the Eclectic medical profession shortly after 1846, in which school it was almost exclusively employed until some years afterward, Mr. Merrell affixed to this substance the term *podophyllin*, which was unquestionably the first application of the word to a commercial drug, and thus he was the promulgator of the term as affixed to a medicine. The drug sprung rapidly into popularity, and its commercial name was so firmly established upon the appearance of King's Dispensatory in 1852, that the term podophyllin was made the principal title for this substance, but Prof. King, in the text descriptive of the root *podophyllum* still referred to it as a "resin to which the name of *podophyllin* has been given."[4]

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[1] *Philosophical Medical Journal*, of New York, 1844, vol. i, p. 1600, and the Western Medical Reformed, April, 1846.

[2] Discovery of Podophyllin, by J. King, M.D., College Journal of Medical Science, Dec., 1857, p. 55.

[3] Preceding 1846 there had been, so far as I can find, no record in regular medicine of such a substance.

[4] Eclectic Dispensatory, 1852, King and Newton, p. 313.

Mr. Merrell, however, did not originate the term as some have supposed, neither is it of Eclectic origin as the majority have accepted. Upon the contrary, my investigations indicate that the word *podophyllin* was devised by no less authority than the authors of the United States Dispensatory, and in connection therewith, we are thrown back to the original investigation of podophyllum.

When Mr. Hodgson (1832)[1] searched for the purgative principle of podophyllum, obtaining by a tedious method "pale brown scales of considerable lustre," which he inferred might dominate the drug, he refrained from affixing thereto a name. Our present knowledge of the nature of the mixture of partly resinous substances that carry the therapeutical force of the drug is evidence, conclusive perhaps, that Mr. Hodgson's search of the decoction of podophyllum root was mainly fruitless and could not have resulted satisfactorily. Even the use of lime in his second experiment, which resulted in the solution of considerable disorganized resinous bodies was counteracted by their subsequent precipitation with sulphate of zinc, the clear aqueous solution obtained thereby being practically destitute of the substances now accepted as characteristic of the drug. Notwithstanding, since the work of Mr. Hodgson, was the only recorded investigation that had been made,[2] the authors of the United States Dispensatory gave it considerable prominence in their first edition (1833), and added thereto, "Should it be found to be the purgative principle of the plant, it would be entitled to the name *podophyllin*."[3] I can find no previous record of such a word, and the high standing and careful work of the authors of the United States Dispensatory render it conclusive in my mind that they created the term, for had they borrowed it, credit and reference would surely have been extended the originator. Thus, it was that when through the therapeutical investigations of Prof. King corroborated by those of his associates, Prof. T. V. Morrow, Prof. Hill and others, the fact was demonstrated that this resin-like precipitate possessed the cathartic qualities of the root in an intensified degree,

[1] Paper read before the Phila. College of Pharmacy, November, 1831, published in the AM. JOURNAL OF PHARMACY, January, 1832, p. 273.

[2] Rafinesque, 1830, Medical Flora or Manual of the Medical Botany of the United States, vol. 2, p. 60, states: "It contains resin, fecula, bitter extractive, gallic acid, and a gummy substance."

[3] Italicized in the original.

Mr. Merrell naturally accepted the word that had been previously devised by the authors of the work that was considered an unquestionable standard.

From this research it is evident to the writer:

(1) That the name *podophyllin* was devised by the authors of the United States Dispensatory, and originally employed in 1833. It was used qualitatively by them in connection with a substance that did not prove to be the purgative principle of the drug, they distinctly saying, "Should it be found to be the purgative principle of the plant, it would be entitled to the name *podophyllin.*"

(2) Upon the discovery of the active cathartic resinous precipitate (1830), Prof. King had previously called it "Resin of Podophyllum."

(3) Upon introducing the drug into commerce, the suggestion of Wood & Bache was accepted by Mr. Wm. S. Merrell and the shorter name *podophyllin* affixed thereto.

[*To be continued.*]

GLYCYRRHIZA LEPIDOTA (*Nuttall.*)

By Madison L. McCullough, Ph.G.

From an Inaugural Essay.

In Gray's Manual, 6th edition, and in Coulter's Rocky Mountain Botany, the following habitat is given for this plant: Minnesota to Iowa, Missouri, Colorado and New Mexico, westward into Nevada and Northern California, and northward to Washington, and across the continent to Hudson's Bay. A statement found in some works that it grows near St. Louis, Mo., could not be verified by a botanist of that vicinity. Good specimens of the plant were secured from Deerlodge City, Montana, in which locality it grows to a considerable extent; but it does not appear to be used medicinally there. The stem is herbaceous; the younger branches are purplish-green and somewhat pubescent; the impari-pinnate leaves have about 17 oblong-lanceolate and acute leaflets; the whitish flowers are in pedunculate spikes; the compressed legume is beset with hooked prickles and contains from 2 to 6 seeds. The root was not sent, but the long and slender rhizome was received and examined. It is from ⅛ to ½ inch in diameter; the older portions are longitudinally wrinkled, of a dark brown color, and closely resemble the

rhizomes of the officinal species. The younger rhizomes are dull yellowish-brown and somewhat scaly. The fracture is short, the taste sweet, afterwards somewhat bitter. The bark is rather thick, and upon transverse section shows a light color and a number of rather wavy bast fibres. The yellow wood is divided into many narrow wedges by narrow medullary rays, the woodwedges being quite porous from numerous ducts, and internally terminate by one or two dark colored cells forming a circle surrounding the pith.

The older and more fully developed portions of the rhizome were selected for preparing glycyrrhizin, and parallel experiments were made with officinal liquorice root. The powder of the American drug was the lighter in color. The powder was exhausted with ammoniated water, the solution precipitated with sulphuric acid, the precipitate washed with cold water, dissolved in ammonia and again precipitated; this process was repeated for the third time, when the precipitate was dissolved in ammonia and the solution poured upon glass to scale. The ammoniated glycyrrhizin from the American plant had a somewhat bitter aftertaste. Equal weights of both products were then dissolved in ammonia, the glycyrrhizin precipitated by acid, and washed with cold water. By this operation the loss in weight of the product from the officinal drug was 21·87 per cent., and from the American plant 25 per cent. Comparing the results we have from

G. glabra,	ammoniated glycyrrhizin	9·2	per cent.,	crude glycyrrhizin	7·18	per cent.
G. lepidota,	"	"	8·53	"	"	"	6·39	"

Washing the crude glycyrrhizins with diluted alcohol caused a loss in the former of 43 per cent., and in the latter of 50 per cent. of the weight. The latter also lost some of its color and sweet taste.

The result of this investigation of G. lepidota was unexpectedly large; judging by the taste not more than 1 or 2 per cent. of the crude ammoniated compound was expected to be obtainable. But the plant is sufficiently rich in the sweet principle to command notice.

Phenyl urethan results from the action of ethyl chloride upon aniline, and is a white crystalline powder, insoluble in water, but freely soluble in alcohol. Prof. Giacomini, of Turin (*Jour. de Méd. de Paris*), has found it possessed of marked antipyretic and analgesic properties, a dose of 0·5 gm. being equal in effect to 1 gm. of antipyrin. It is preferably administered dissolved in sherry wine, to prevent cyanosis and other unpleasant symptoms.

THE CRYSTALLINE PRINCIPLE OF PERSIMMON BARK.

By William Schleif, Jr., Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.—No. 76.

In this Journal, February, 1888, Mr. F. H. Murphy described a proximate analysis of the bark of the persimmon, *Diospyros virginiana;* he found among the usual constituents a peculiar crystalline principle. This appeared in the ethereal extract, and was in one instance obtained from ether in cubical masses, soft but crystalline; in subsequent experiments a granular mass resulted. The principle was soluble in alcohol, chloroform and ether, but insoluble in water. The object of this thesis is to more fully determine the characteristics of the compound.

Three samples of bark were taken: No. 1 was collected by myself during the spring in New Jersey; No. 2 was 5 pounds of a commercial sample, and No. 3 collected during the autumn in Southern Illinois. The different samples in No. 40 powder were completely exhausted with petroleum ether, the extract passing off with a yellow color, and leaving only a waxy residue on evaporation. The next treatment was with commercial ether, the extract having a deep wine red color in the case of Nos. 1 and 2 and a light yellow in the case of No. 3. The ether was recovered by distillation, and the remaining, crystalline, deep-red extract constituted the crude material from which the principle was prepared.

The following methods were used for its purification:

(1) The extract was repeatedly crystallized from ether. This yielded a light brown crystalline, soft substance, very bulky, but drying to a very small quantity if warmed on a water bath at 60° C., or over sulphuric acid at ordinary temperatures. The alcoholic solution was slightly precipitated by alcoholic solution of lead acetate, the precipitate being of a light brown color.

(2) The ethereal extract was dissolved in hot alcohol, in which it was completely soluble, and precipitated by alcoholic solution of lead acetate, which removed coloring matter, but did not affect the principle, which was separated from the filtrate by evaporation, after removal of the excess of lead by hydrogen sulphide.

The alcoholic solution still retained a red-brown color, but was much lighter than at first, it was repeatedly digested with animal

charcoal on a water bath, and recrystallized from alcohol until the solution became light yellow and the dry substance a light grayish-yellow color. The lead acetate precipitate after washing with alcohol, yielded nothing to hot alcohol or ether.

(3) The alcoholic solution of the ethereal extract was precipitated by lead acetate, filtered and the substance precipitated by throwing the filtrate into a large quantity of water. It separated with a brown color. The whole was then shaken with ether, the ethereal layer removed and evaporated.

This method necessitated further treatment with animal charcoal, and was not so satisfactory as No. 2, because of the smaller yield.

(4) The alcoholic solution was precipitated by admixture with water, the precipitate still retained considerable coloring matter. Both the precipitate, dissolved in alcohol, and the filtrate, which was transparent, but strongly opalescent, yielded precipitates with lead acetate. The second method, therefore, proved to be the more satisfactory.

Some of these crystals were 2 centimeters in length, the crystalline masses were dark red, soft and translucent, but completely lost their crystalline appearance on drying, no matter how carefully performed.

Alcoholic solution of lead acetate precipitated only coloring matter for the following reasons:

(1) The precipitate, when thoroughly freed from the adhering solution by washing with alcohol, yielded nothing to hot alcohol or ether and left a dark mass on drying, the original solution becoming considerably lighter by this precipitation.

(2) The method of simple recrystallization from ether gradually deprived the principle of color, its solution in alcohol producing a precipitate with alcoholic solution of lead acetate, which decreased in amount as the color became lighter.

(3) The alcoholic solution of the ethereal extract of the third specimen of bark was light yellow and was precipitated in a much smaller degree than the corresponding extracts of the other two specimens of bark, which were deep wine-red.

Physical Properties.—In the purest state I obtained it, the principle was in decidedly crystalline masses when obtained from ether or alcohol, soft and of waxy appearance when moist, drying to about

one-tenth of its previous volume, a complete loss of its crystalline structure accompanying this process.

The dried substance was granular, somewhat glistening, light brownish in color, of a peculiar odor and slightly astringent taste, soluble in alcohol, ether, chloroform, very slightly in water, insoluble in carbon disulphide and petroleum ether. Heated to 258° C. it darkened considerably, and at 262° C. it assumed the appearance of a deep red, decomposed fused mass.

Chemical Properties.—It had a neutral reaction, was not dissolved by boiling dilute hydrochloric acid or boiling dilute solution of potassium hydrate, and burned on platinum foil without leaving any residue. Its solution in alcohol was not precipitated by alcoholic solution of lead acetate or spirit of ammonia; a very slight darkening in color was produced by ferric chloride, or by a mixture of ferrous and ferric salt. It dissolved completely in glacial acetic acid on warming, a white precipitate being produced on dilution with water, but whether unchanged or as an acetyl compound was not determined. Eighty per cent. acetic acid dissolved it very slowly.

On heating the principle at 100° C. for one hour with dilute hydrochloric acid, filtering, neutralizing with potassium hydrate, shaking the clear filtrate with chloroform, and allowing the separated chloroform to evaporate, no residue except a slight one of potassium chloride, remained. A fruity odor was developed during the boiling.

Two ultimate analyses gave the following results:

	I.	II.
C,	67·44	67·10
H,	9·60	9·93
O,	22·96	22·97
	100·00	100·00

These figures indicate the formula $C_{39}H_{67}O_{10}$. The principle gave no evidence of the presence of nitrogen, and in solubility and general properties is more closely related to the resins than to any other class of plant compounds.

Papain has been found of great use in cleansing the middle ear, especially after the formation of caseous material, which is liquefied by keeping it in contact for about an hour with 15 minims of a 5 per cent. solution of papain in water, made alkaline by sodium bicarbonate. The ear is afterward syringed with a solution of boric acid.—*Edin. Med. Jour.*, Jan. 1890.

TURPENTINE.[1]

By Emmett Leroy Murray, Ph.G.

To obtain turpentine the tree is "boxed" or incised about a foot above ground to the extent of 7 in. deep, 3 in. wide and 13 in. across face. The best season for boxing is from Nov. 15th to March 1st, as the sap does not run during this time. The next step is that of "chipping" the tree with an instrument known as the "hack," which consists of a curved blade made of best steel, 2 in. wide and 2½ in. long, fixed into a handle from 1½ to 2 ft. long, weighted at the opposite end, the whole weighing about 20 pounds. The turpentine farm is divided into "crops" of 10,500 boxes each, worked by one man, who is required to go over his crop once a week and chip off ½ in. of sap wood and bark, so as to expose fresh surfaces, for at end of that time the turpentine almost ceases to exude. Trees are "chipped" only in summer season, from March 15th to Oct. 1st, as the turpentine flows only during warm weather. Once every four weeks the crop is to be gone over by a second man, whose business it is to transfer the turpentine collected in the boxes to barrels. This "dipping" is done with a flat heart-shaped steel attached to a four-foot handle. In September the turpentine adhering to the face of the trees, and which has not run into the boxes is removed. This product is distinguished as "Opaque," and amounts to about 25,000 lbs. to each crop yearly. The collected turpentine is transferred to stills made of copper $\frac{1}{16}$ to $\frac{1}{8}$ in. thick, and holding from 10 to 16 barrels of crude. In Willcox County the still is bricked in over a large furnace, which is level with the ground. To the cap (or neck) of the still is attached a condensing worm 100 ft. in length, making six curls in a large tank of cold water, at bottom of which is an exit for the distillate. The barrels of crude are taken, by means of skids, to the second story, and when the still cap is removed, the head fastenings of a number of barrels are loosened and contents emptied into the still. To prevent unnecessary wastage, these barrels are then inverted over a trough to drain. If the still contains "virgin turpentine" (or that collected from first year's chipping), less heat is required to complete the operation, but when "yearling turpentine" (or that col-

[1] Mr. Murray's inaugural essay, of which an abstract is here given, supplements, to some extent, the information given by Mr. Dunwody (see June number, p. 284).—Editor.

lected from second, third and fourth year's chipping) is used, the heat must be increased. This distinction is due to the latter being more dense and containing more resin than oil in proportion; therefore, the yield of oil is not so great. During distillation, water, in quantities of 8 to 16 gallons to each barrel of crude, is gradually added through a small funnel arranged in the cap. This prevents the turpentine from scorching, besides clarifies the resin and improves its quality. When the turpentine is exhausted of oil, the cap is removed and the contents of the still are agitated for a while; at length the gate at the bottom is opened and the mixture of resin and impurities, such as small chips, bark, etc., flows out upon sieves arranged in tiers over a large trough, from which the melted resin is transferred to barrels, made of rough material, for when the resin once becomes solid, it requires but little stave support. The chips, etc., are removed from the sieves and burned.

The following is a brief summary of facts, which may be of interest:

Three hundred boxes yield 1 barrel crude.

Five barrels crude yield 1 barrel oil (spirits).

Five barrels crude yield 3 barrels resin.

Resin from first year's yield is classed in commerce as W. W. (water white) and W. G. (window glass). Resin from second year's yield is classed as N, M, K, etc.

Oil (spirit) barrels are made to hold 50 gallons. The oil varies in price from 30–50 cents per gallon. Resin barrels usually hold about 280 lbs.; it varies in price from $1 to $3 per barrel.

GLEANINGS IN MATERIA MEDICA.

By John M. Maisch.

Delphinium Staphisagria.—The seeds were analyzed by Charalampi Kara-Stojanow (Inaugural-Dissertation, Dorpat). *Delphinine* and *delphisine* have the same composition, $C_{31}H_{49}NO_7$, crystallize from their solutions in ether and petroleum benzin, the form of crystals being alike; their melting points are almost identical (191° and 189° C). They give no color reactions and dissolve freely in chloroform. Greater differences were observed in their behavior to water, alcohol, ether and benzol. Delphinine has an acrid and benumbing taste, while the taste of delphisine in alcoholic solution

is bitter, a burning sensation being left on the tongue. *Delphinoidine* is amorphous, melts at 152° C., has a bitter, scarcely acrid taste, is soluble in ether, and yields amorphous salts, which are soluble in water. The mixture of alkaloids insoluble in ether, which has been known as *staphisagrine*, was found to consist of at least four alkaloids, all of which are amorphous and have a bitter taste. The physiological action of the different alkaloids was determined by Prof. Kobert; they do not enlarge the pupil, but otherwise resemble aconitine in their action, though decidedly weaker than the latter alkaloid, and differing more or less among themselves. The closest relation to aconite is shown by delphinine, but the lethal dose for cats and dogs is 1·5 and 0·7 mgm. respectively for the two crystalline delphinium alkaloids. Delphinoidine has a more decided narcotic action, the lethal dose being 5 mgm.

Japanese aconite, called kusa-uzu.—These tubers, the botanical origin of which has not been satisfactorily established, was examined by Arthur Lubbe (Inaugural-Dissertation, Dorpat, 1890). The crystallized alkaloid, purified by repeated recrystallization, was found to be free from bitter taste, to melt at about 184° C., and to not give any characteristic color reaction. It is identical with aconitine, and has the formula $C_{33}H_{44}NO_{12}$. The hydro-bromide and chloride yield again the same base unaltered. Physiological experiments made with this alkaloid also showed its identity with that obtained from *Ac. Napellus*. It was observed that it passes, to some extent, into the saliva unaltered. The presence of pseudaconitine could not be established; but, besides the crystalline aconitine, at least two amorphous bases, having a bitter taste, were recognized.

Japanese aconite, called Shirakawa-Bushi.—Dr. O. Lezius examined these tubers (Inaugural-Dissertation, Dorpat, 1890), which agreed in appearance and structure with the drug described by Langgaard (see Proceedings Amer. Phar. Assoc., 1881, p. 179) under the name of Shirakawa-uzu. In Japan, the parent tubers of aconite are usually distinguished as *uzu*, from the secondary tubers which are designated *bushi*. The tubers examined are, therefore, most likely mainly these latter tubers, presumably of *Aconitum chinense*. Besides two amorphous bases, which were not further examined, 0·02 per cent. of crystallized alkaloid was isolated in the pure state and chiefly used for physiological investigations, which were identical in their

results with those produced by aconitine from *Ac. Napellus.* The identity of these two alkaloids was corroborated by the acrid, not bitter, taste; by the melting point (180·9° C.); by the absence of color reactions; by the rhombic plates of the hydriodide, etc. The small yield of aconitine is undoubtedly due to the fact that the tubers had been preserved by salting them.

The alkaloids of Corydalis cava have been studied by Fr. Adermann (Inaugural Dissertation, Dorpat, 1890) who ascertained that the alkaloid previously described as *corydaline* consists of three or four distinct alkaloids, one of which has properties and composition closely analogous to *hydroberberine.* It forms colorless crystals which, in contact with light, turn yellow, are freely soluble in chloroform and benzol, and dissolve in 1 part of strong alcohol, in 28 p. ether, sp. gr. 0·782, in 35 p. absolute ether, in 320 p. petroleum benzin, and in 4792 p. water. It has the composition $C_{20}H_{23}NO_4$, melts at 138° C., and has no characteristic color reactions. Fröhde's reagent colors transiently green, and most oxidizing agents produce a yellowish-red color. On boiling the alcoholic solution it turns yellow, and then contains *berberine*, which is also produced by careful treatment of the solution with chromic acid. Berberine is present in notable proportion in the chloroform solution of the crude alkaloids, and since the fresh tuber has a yellow color, this alkaloid doubtless exists ready formed in the plant, and more of it is likely to be produced during the process of isolating the hydroberberine-like alkaloid. An alkaloid for which the author proposes to retain the name *corydaline*, crystallizes in long, soft needles of a silky lustre, turning grayish-green in contact with light and with alkalies. Its composition agrees with the formula $C_{22}H_{21}NO_4$. The alkaloid, like the first one, is somewhat dextro-rotatory. Corydaline requires for solution 198 p. ether, 338 p. absolute ether, 150 p. strong alcohol, 45·5 p. benzol and 7064 p. water. The salts are intensely bitter and crystallize readily. Sulphuric acid colors yellowish, changing to a splendid violet. Violet colors are also produced by Fröhde's reagent, by selenosulphuric acid, and by sulphuric acid containing nitrate or chromate; the latter reaction resembles that with strychnine, but the color is more of a reddish tint and disappears more rapidly. *Fumarine* shows similar behavior, and is probably closely related to corydaline. The amorphous base was present in the tuber only in small quantity, and its purity could not be established.

Sulphuric acid, with the addition of a little nitrate generated the odor of bitter almonds.

Ephedra monostachya, Linné.—This shrub is used in Southern Siberia as a popular remedy in gout and syphilis, a decoction of the branches and root being employed, while the pseudo-fruit, containing 13·89 per cent. sugar, either candied or its gelatinous juice, are esteemed in pectoral complaints. The stem attains a height of about two feet and has numerous round, warty and forking branches resembling equisetum; the dividing points are knotty and bear quite small, membranous, sheathing and 2 or 4-parted leaves which, on drying, become easily detached. The root consists of a tuberously enlarged main root sending out long, horizontal branches 2 inches thick, and like their descending branches, which have the size of a quill, twisted around their eccentric axis. The exfoliating bark of the root is tough, but the wood after drying is easily split in a radial direction into thin layers and may be rubbed to powder between the fingers. The inaugural dissertation of Paul Spehr (Dorpat, 1890), contains also a brief histological description of the stem and root. The former is free from starch, but the root contains a small quantity in some parts of the medullary rays. Tannin and pyrocatechin are present in the overground portion but not in the root. The latter yielded only a minute quantity of amorphous alkaloid, while from the branches 0·03 per cent. of pure crystallized alkaloid was isolated. Its composition corresponds to the formula $C_{13}H_{19}NO$. The pure alkaloid does not give any characteristic color reaction. It melts at 112° C., and its chlorhydrate at 207° C. The alkaloid is readily soluble in water and alcohol, is nearly insoluble in petroleum benzin, and requires 11 parts of chloroform, 1,180 parts of benzol, and about 100 parts of ether for solution; oxidation with permanganate yields benzoic acid. The taste is at first imperceptible, then becomes burning and benumbing. Professor Kobert observed it to exert toxic effects upon frogs, but doses of 0·2 gm. given to dogs and cats were almost without action. The alkaloid differs from ephedrine and pseudephedrine of *Ephedra vulgaris*, which have a bitter, astringent taste and a mydriatic and poisonous action.

Siberian cedar nuts, the seeds of Pinus Cembra, *Linné*, attain a length of 11 mm. and a width of 9 mm., are ovate in shape, irregularly and obtusely triangular, have a brown-reddish, hard and brittle

testa, a thin, brownish inner seed coat and a milk-white oily kernel. The large parenchyma cells of the endosperm contain roundish aleuron granules and minute starch grains. The elongated embryo terminates in about eleven narrow cotyledons, forming a head and enclosing the plumule. Analyzed by Professor E. Lehmann, of Tomsk)*Phar. Ztschr. f. Russl.*, 1890, pp. 257 and 273), the kernel weighing something over one-half of the seed, yielded 56 per cent. fixed oil, 6 per cent. albumin, 2·7 per cent sugar, 1·6 per cent. starch, 9 per cent. moisture, and 2·6 per cent. ash. The fat contains myristicin, but consists chiefly of an olein which is probably identical with linolein.

Adulterated Mace.—Dr. T. F. Hanausek received from Northern Germany a sample of mace which was adulterated with the arillus of another species of myristica, and agreed in nearly all respects with Bombay mace described by the author in 1887. The large cells contain a resinous body which dissolves in alcohol with a saffron yellow or almost greenish-yellow color. The addition of an alkali changes the color to red, and on acidulating the liquid the yellow color is restored. The test is best performed by rendering the alcoholic tincture of the material sufficiently alkaline that filtering paper impregnated with the liquid has an orange color, the paper is washed with water to remove excess of alkali, and a trace of an acid is now sufficient to produce a saffron-yellow spot. On examining a transverse section of a branch of Bombay mace, the cells near both surfaces are observed to be homogeneously filled with a golden-brown or lemon-yellow mass of oil and coloring matter, leaving the middle zone of the tissue of a white color. This nearly odorless and tasteless mace is probably derived from Myristica malabarica, *Lamarck.—Ztsch. f. Nahrungsm. Unters.*, 1890, 17.

CHEMICAL NOTES.

By Henry C. C. Maisch, Ph.G., Ph.D.

A new Alkaloid from the Root of Scopola atropoides.—E. Schmidt (Apoth. Zeit., 1890, v, 186) found that two substances which had been sent to him by Bender as hyoscine and hyoscine hydrobromide, and which had been prepared from 100 kg. of Scopola atropoides, differed from hyoscine as described by Ladenburg. The free alkaloid melts at 59° C.; on drying over sulphuric acid and then heating to 60° C., it lost over 5 per cent.; the gold double salt melts at

214° C. (Ladenburg, 198° C.), and an analysis yielded results corresponding to $C_{17}H_{21}NO_4$. The hydrobromide above referred to had the composition $C_{17}H_{21}NO_4HBr + 3H_2O$, and is the salt of the above alkaloid. Schütte found the same also in Atropa Belladonna, Duboisia myoporoides and Datura Stramonium.

Solanidine from Potato sprouts.—A. Jorissen and L. Grosjean (Bulletin de l'Acad. Belgique, 1890 (3), xix, 245) obtained from fresh sprouts, besides solanine and solaneine, which, on boiling with dilute mineral acids, yield solanidine, also the latter alkaloid. The fresh sprouts are treated in a closed vessel for some days with officinal ether. This is decanted, filtered, and the solvent recovered. The residue is treated with alcoholic potassium hydrate to saponify the oil, the soap dissolved with water, and the residue dissolved in hot alcohol. By repeated crystallization from alcohol and ether, the authors obtained pure solanidine. The fresh sprouts, containing 90 per cent. water, yield 1·5 per cent., but the dry no alkaloid extractible with ether. A new reaction for solanidine is the following: A solution of solanidine in glacial acetic acid is evaporated to dryness on a water bath in a porcelain dish; the residue, treated with concentrated hydrochloric acid and ferric chloride, turns yellow, and heated again until dry, it turns violet.

The composition of Digitonin.—The digitalin of commerce consists, according to Schmiedeberg, of digitoxin, digitonin, digitalin, and digitalein. Ludwig, Delffs, Walz and Kosmann found that on heating commercial digitalin with dilute acid a substance was obtained which reduces Fehling's test. Schmiedeberg made the same observation with his purified digitonin, and found also a body which is insoluble in water, which he named digitogenin. H. Kiliani (*Ber. d. Deutsch. chem. Gesell.*, 1890, 1555) made an investigation of a commercial digitalin which was almost completely soluble in water. The hydrolysis was carried on as follows: 1 pt. commercial amorphous digitalin was dissolved in 10 pts. water; then 1 pt. concentrated hydrochloric acid sp. gr. 1·19 was added and the solution heated on a water-bath for six hours. A precipitate is formed which is separated by filtration and washing with cold water. The soluble decomposition products are galactose and dextrose, and the insoluble one is the digitogenin of Schmiedeberg. The composition of the latter is very likely $C_{15}H_{24}O_3$, while digitonin is very likely $C_{27}H_{44}O_{13}$.

On Indian Oil of Geranium.—F. W. Semmler (*Ber. d. Deutsch. chem. Gesell.*, 1890, 1098) examined this oil as obtained from *Andropogon Schœnanthus* by Schimmel & Co. The properties were the same as those given by Beilstein (*Chemie*, iii, 265); the rotation in a 10 cm. tube was—20′. Fractional distillation in vacuum yielded as principal constituent (90 per cent.) *geraniol* $C_{10}H_{18}O$; the boiling point at 17 mm. pressure is 120·5–122·5°, and the refraction 48·71. Phosphorus pentoxide yields a terpene, boiling point 60–65° C. and a polyterpene, boiling point 205–210° C. Geraniol is undoubtedly an alcohol belonging to the series $C_n H_{2n} - {}_2O$.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Russian peppermint oil was examined by Hugo Andres with the following results: The sample examined was obtained from the fresh herb, had a greenish-yellow color, specific gravity 0·915 at 15° C., and a rotary power $\alpha_D = -17{\cdot}13$. The portions obtained by distillation and congelation after fractional distillation had the following boiling points: 160–165°, 173–175°, 203–206° and 206–209°. The first fraction consisted of menthene $C_{10}H_{18}$ and a terpene. The second fraction showed the greatest optical activity; a terpene was separated which boiled at 176°, at 20° had the specific gravity 0·8571, and a rotary power of $\alpha_D = -41{\cdot}19$; it was identical with Wallach's *limonene*. The last two fractions consisted of mixtures of menthone $C_{10}H_{18}O$ (b. p. 206–208°) and menthol $C_{10}H_{20}O$ (b. p. 211° C.), the separation being effected as follows: 10 grams of the fractions (each one treated separately) were dissolved in 25 gms. alcohol, 8 gms. hydrochlorate of hydroxylamine, and a slight excess of sodium bicarbonate added, the mixture set aside for three days, then an excess of water added, the oily layer separated and agitated with 20 per cent. sulphuric acid, the undissolved oil (menthol) removed and the acid solution agitated with ether, the ethereal solution removed and the ether evaporated; dextrogyre menthoxim was here obtained, which by heating on a water-bath with dilute hydrochloric acid decomposed, yielding a clear oil (menthone) boiling at 206–208°, $\alpha_D = +8\,04$, and by analysis agreeing to formula $C_{10}H_{18}O$. In this method of separating menthone and menthol, the former unites with hydroxylamine, while the menthol does not.

Russian peppermint oil does not give an absorption spectrum of itself, but a mixture containing 10 cc. of the oil, 5 cc. glacial acetic acid and 5 cc. nitric acid will, after two minutes, show 2 bands, one in the red and the other in the orange part of the spectrum; after 5 minutes a third band is found in the green; after 20 minutes the three bands unite. The mixture viewed by transmitted light was green, after 5 minutes' standing a blood-red fluorescence was visible, and after 20 minutes the color by transmitted light had changed to a pure blue. These spectroscopic results do not show much difference from the English peppermint oil, but the several changes occur more quickly with the Russian oil.—*Pharm. Ztschr. f. Russland*, 1890, 341 and 357.

Medicinal Soaps.—Neutral fluid soaps are at present claiming considerable attention. A pamphlet of Dr. A. Gude & Co., of Leipzig, on the subject, contains the following information: *Iodine soap*, containing *free* iodine, deteriorates rapidly, and can be preserved only for 8 days. *Resorcin* must be incorporated in neutral soap only; *hydroxylamine* can only be preserved in acid soaps; in neutral or alkaline soaps there is constant decomposition, rendered visible by the evolution of gas. *Chrysarobin* is not soluble in neutral soap, but easily soluble in alkaline soaps. *Thiol, Peru balsam* and *tar* make permanent mixtures with fluid soaps. Soft neutral soaps of ointment-like consistence answer very well for insoluble substances like *sulphur*, which would separate from fluid soaps. In using neutral or excessive-fat soaps, hot water should be taken, so as to dissolve the soap and allow its removal from the skin. —*Pharm. Centralhalle*, 1890, 384.

Menthol-glycerin-cream, for the cleansing of teeth, is made by mixing 20 parts precipitated calcium carbonate, 10 parts powdered medicinal soap and 5 parts magnesium carbonate, with sufficient glycerin to form a soft mass, then coloring with carmine and flavoring with menthol.—(*Ind. Blätter*) *Pharm. Centralhalle*, 1890, 384.

Potassium tellurate is recommended by Dr. E. Neusser for the treatment of night sweats in pulmonary diseases; it is given in pill form in doses of 0·02 gm (⅓ grain), generally this dose is sufficient, but double the dose can be taken without any other disagreeable effect save the appearance of the tellurium-breath. (*Wr. Klin. Woch. Pharm. Post.*, 1890, 467.

Discoloration of Antipyrine.—Dr. Grüner has noticed that a

sample of antipyrine put up in a metal box had a decidedly *reddish yellow* color where the powder came in contact with the metal. Examination of the sample showed it to answer all tests of purity excepting the color. To prevent the discoloration the powder is recommended to be put in glass containers or transferred to such as soon as received by the apothecary.—*Oesterr. Ztschr. f. Pharm.*, 1890, 301.

Eugenol has been found by Pomeranz to be a constituent of oil of sassafras although in small quantity. From 3 kilos crude sassafras oil he obtained 7 grams of a phenol boiling at 246–247° having an eugenol like odor and which by analysis and conversion into the benzoyl-derivative was proven to be identical with the eugenol of the oil of cloves.—(*Monatsh. d. Chemie*) *Apotheker Ztg.*, 1890, 345.

Fluid glycerin-soap. 500 gm. olein, 100 gm. alcohol and 280 gm. potash lye (33⅓ per cent.) are placed in a flask and agitated frequently while warmed in a steam-bath for one-half hour, a solution of 50 gm. potassium carbonate in 100 gm. water is then added and the heating continued until a portion removed is perfectly soluble in water. The soap is next dissolved, with heat, in 1570 gm. glycerin, set aside for a few days in a cool place and filtered; the filtrate can be perfumed as desired.—*Pharm. Ztg.*, 1890, 386.

Antipyrine and sodium salicylate have frequently been noticed to liquefy if the powders had been intimately mixed and exposed to the atmosphere for a short time. Prof. Spica (in L' Orosi of May, 1890) finds the liquefaction possible only in moist air and to be attended by an increase in weight, and after careful experiments states that no chemical change takes place. The hygroscopic sodium salicylate by absorption of water enables the antipyrine to dissolve, the latter being more soluble than the sodium salicylate. He also gives a method for obtaining the true *antipyrine salicylate:* 100 parts antipyrine are dissolved in a rather large quantity of boiling water and 73·4 parts sodium salicylate added in small portions; on cooling the new chemical separates in crystals; they have the formula $C_{11}H_{12}N_2OC_7H_6O_3$.—*Pharm. Ztg.*, 1890, 386.

Salipyrine.—The publication of the above article has occasioned the announcement that J. D. Riedel, of Berlin, has applied for patents in various countries covering the manufacture of antipyrine salicylate, to be known as "Salipyrine" Riedel. The mode of preparation is not made public, but it is stated to be cheaply made, as

it is not necessary to use the expensive commercial articles. In addition to the method of Prof. Spica, it is possible to make this new compound (1) By heating in a steam-bath the molecular proportions of antipyrine and salicylic acid with or without a small quantity of water; after cooling, the solid mass is recrystallized from alcohol; (2) The antipyrine is dissolved in water, the salicylic acid in ether; after thorough agitation of the mixed solutions the salt separates out slowly, being only slightly soluble in either liquid; (3) Very pretty crystals can be obtained by dissolving the antipyrine in chloroform, the salicylic acid in ether and mixing the two, rather dilute, solutions. The salt made by the secret method has been made in large quantities, and the results of its use in hospitals have been very favorable. It forms a coarsely crystalline, white, odorless powder, of a sweetish not unpleasant taste; easily soluble in alcohol and benzol, difficultly soluble in ether and water (boiling water, 4·4:100; cold water, 0·4: 100); it melts at 91·5° C. (Prof. Spica, 89–90°). Sulphuric acid liberates salicylic acid and sodium hydrate liberates antipyrine, allowing an easy determination of purity. A weighed quantity is dissolved in water in a separating funnel, a measured excess of $\frac{2}{n}$ sodium hydrate solution added and the separated antipyrine dissolved by agitating with chloroform; the chloroform solution is evaporated in a tared vessel, the antipyrine (42·3 per cent.) weighed and its purity further established by a melting point determination (should be 113°). The sodium salicylate solution is next titrated with sulphuric acid and the salicylic acid (57·7 per cent.) taken up with ether, the ethereal solution evaporated and a melting point determination made (should melt at 155° C).—Dr. L. Scholvien, *Pharm. Ztg.*, 1890, 395.

Potassium nitrate in potassium iodide is positively detected by the following test: By use of pure dilute hydrochloric acid and pure zinc an energetic evolution of hydrogen is started, after 8–10 minutes the solution of potassium iodide, to which some starch paste has been added, is introduced; no violet or blue color should be produced even after standing some time. The object in letting the hydrogen evolution proceed for some time before adding the potassium iodide is to change any free chlorine which may be present in the acid into hydrochloric acid.—Dr. Brenstein, *Pharm. Ztg.*, 1890, 400.

Croton oil and Croton-olic acid.—Professor Kobert and one of his scholars have finished an investigation deciding the question of the differences in croton oil and its action. (1) *Commercial croton oil*; (2) *acid croton oil*, the portion soluble in alcohol; (3) *neutral croton oil*, the portion only slightly soluble in alcohol, and (4) *pure croton-olic acid* were examined for their activity. The crotonolic acid was prepared by taking a strongly acid commercial oil, extracting the portion soluble in alcohol and treating this with an excess of hot-saturated solution of baryta for one-half hour on a water bath; the white mass formed is thoroughly washed with water to remove excess of baryta, coloring matter and salts of acetic, butyric and tiglic acids, drained, completely dried in a vacuum and extracted with ether. The barium salts of lauric, palmitic and stearic acids are insoluble, while those of oleic and crotonolic acids are soluble; the latter two salts are separated by evaporating the ether, treating the residue with absolute alcohol, which dissolves the crotonolate of barium only; on cautiously adding sulphuric acid, filtering and evaporating, croton-olic acid is obtained.

No definite solubility in absolute alcohol can be ascribed to croton oil, the solubility depending upon the age of the oil, *i. e.*, the presence of croton-olic acid, some samples of old oil containing no glyceride of croton-olic acid, but only the latter in the free state.

The activity of the samples disclosed the following: The *commercial* and *acid* oils as well as *croton-olic acid*, used in experiments upon animals, had less effect than upon the human being, but diarrhœa followed the use of the three samples. The *neutral* oil, the activity of which upon man was confirmed, failed to produce any effect upon animals. Experiments go to prove that the pancreatic ferment has the power of liberating croton-olic acid from the *neutral* oil. The introduction into the blood vessels of sodium carbonate emulsions of the commercial oil produced serious poisoning symptoms in quantity of 8 mg. to 1 kilo weight of the animal; *acid* croton oil was more poisonous, requiring less than 5 mg. for 1 kilo; and of croton-olic acid the lethal dose is less than 4 mg. for 1 kilo. Sodium croton-olates, obtained from acid or neutral oil, were identical; hence, the conclusion of Senier, that the alcohol soluble portion of croton oil represents a peculiar oil-modification, is no longer tenable.

Interesting is the fact that insane persons, like animals, are not

susceptible to the *neutral* oils, but form no exception when using the *acid* oil, showing that there is no decomposition of the glyceride into the free croton-olic acid. Croton-olic acid, administered in the form of keratin-coated pills, is rather uncertain in its action if in quantity less than 10 mg., above this dose the action was absolutely certain, but attended with such burning pains in the intestines as to prohibit its use. For human beings they claim only the *neutral oil* should be used.—E. von Hirscheydt (Kobert's Arbeiten, 1890, iv,) *Rpt. der Pharm.*, 1890, 173.

PRACTICAL NOTES FROM VARIOUS SOURCES.

BY THE EDITOR.

Inefficiency of Compressed Tablets.—The *Correspond. für Schweizer Aerzte* reports several cases in which compressed tablets containing antipyrin, and others of phenacetin, passed through the intestinal canal unaltered.

Administration of Bromoform.—Dr. Stepp found bromoform useful in whooping-cough, if administered pure, merely covered by water. The dose for children of three or four weeks is one drop, 3 or 4 times daily; older nursing children 3 drops according to the intensity of the attack; up to seven years of age 6 or 7 drops three or four times a day. The bromoform should be ordered only in small quantities, and should be protected from the light to prevent decomposition.

Administration of Menthol.—Dr. Gottschalk prescribes menthol 1·0, alcohol 20·0, water 150·0, and for vomiting of pregnancy orders one tablespoonful every hour.—*St. Petersb. Med. Woch.* See also April number, p. 208.

Administration of Carbon Disulphide.—In cases of dysentery, Dr. Jakobleff administers calomel in hourly doses of 0·06 to 0·12 gm., until calomel stools are produced, and during this time enemata are given twice daily, of carbon disulphide 0·1 in water 50·0 gm. For internal use the daily quantity is carbon disulphide 0·2 to 0·3 gm., given in half a tumblerful of water or milk, with a little peppermint. —*Jour. Am. Med. Assoc.*, June 14.

Otorrhœa Pellets.—Dr. Shield (*Practitioner*) uses pellets prepared of cacao butter suitably medicated. After inserting a pellet the patient is ordered to lie down with the affected ear uppermost, when

the pellet will melt and the liquid come into contact with the affected parts.

For softening ear-wax, La Clinique recommends a solution of boric acid 0·6 gm. in glycerin 15, and water 15 gm. The solution is warmed, and 5 to 10 drops of it are put into the ear twice a day.

Mercuric Collodion, as a remedy for warts, is prepared by Dr. Kaposi of mercuric chloride, 1 part, dissolved in flexible collodion, 30 parts. It is applied with a brush once daily to the wart and around its base.

Socin's antiseptic paste is prepared of zinc chloride 5, zinc oxide 50, and distilled water 50 parts. It is used as a dressing, dries rapidly, forms a strong layer, and this may be still strengthened by the incorporation of some cotton.—*Med Chir. Rundsch.*, May 15, 1890.

Elastic bougies, filled with mercury, have been found advantageous by Dr. L. Casper, their weight causing them to slip easily into the bladder.—*Therap. Monatsh.*, May, 1890.

Unguentum Chrysarobini, for use in piles, is directed by Dr. Kosobudski to be made of chrysarobin 0·5, iodoform 0·2, extr. belladonnæ 0·4, and petrolatum 15 gm., to be applied three or four times daily.

Suppositoria Chrysarobini, for internal piles, are ordered by the same author of chrysarobin 0·6, iodoform 0·2, extr. bellad. 0·1, and sufficient cacao butter for ten suppositories.—*Russk. Medits.*

Iodized Wine.—Wine completely covers the taste and caustic properties of iodine. This effect is usually ascribed to the presence of tannin, but Mr. H. Barnouvin has shown in 1885 (*Jour. de Phar. et de Chim.*) that this theory is not correct; for after removing the tannin by means of gelatin, the properties of iodine will still be completely covered if used in the proportion of 1 gm. to 1 liter of this wine. Mr. Barnouvin (*Bull. Gén. de Thérap.*, Febr., 1890, p. 128), in again directing attention to this fact, states that iodized wine may be prepared simply by the addition of an alcoholic solution of iodine to wine. Thus prepared without the addition of tannin, iodized wine has been employed with the most satisfactory results.

Naphthol-camphor is prepared from one part of beta-naphthol and two parts of camphor, the mixture forming a brownish transparent liquid. This is employed by Dr. Schwartz (*Wien. Mediz. Presse*,

Decbr., 1889) as a dressing for various ulcers, the application being renewed every day or two. It effects healthy granulation and cicatrization without producing toxic symptoms.

Antiseptic Mouth Wash.—A formula, published in *Therap. Monatsh.*, Febr., 1890, directs saccharin 1·0, sodium bicarbonate 0·5, and alcohol 100 gm., with 2 drops of oil of peppermint. For use add a teaspoonful to a small glassful of water.

Tincture of Helianthus annuus is stated by Dr. Maminoff to have given excellent results in the treatment of intermittent fever of children. It was prepared from the fresh flowers and bark of the plant, of the strength 1 : 5. The dose was 10 to 25 drops three or four times daily. The children took the medicine readily. No secondary effects were observed.—*Les Nouv. Remèdes*, 1890, p. 78.

Carbolated oil, prepared of carbolic acid 1 part, and olive oil 15 parts, is a very efficient remedy in itch, according to the experience of Dr. F. Trisilian.—*Les Nouv. Remèdes*, 1890, p. 225.

Administration of Naphthalin.—Owing to its insolubility in water and weak alcoholic liquids, Tichborne advises it to be dissolved in a fixed oil, and this solution to be converted into an emulsion in the usual manner. To obtain it in powder, naphthalin is best precipitated by pouring its solution in strong alcohol or acetic acid into cold water, collecting the precipitate, washing it well with water, and drying at a gentle heat.

SHORT METHODS FOR ASSAYING GALENICAL PREPARATIONS OF OPIUM,

AND A REVIEW OF FLÜCKIGER'S METHOD FOR OPIUM ASSAY COMPARED WITH SQUIBB'S AND STILLWELL'S.

By J. B. NAGELVOORT.

"The presence of sugar makes the estimation of alkaloids more difficult."—*Dieterich and others.*

"To separate in one operation the whole of the morphine in a perfectly pure state is an impossibility."—*Digest of Criticisms on the U.S.P.*, 1890, III, p. 319.

Opium assays are always interesting, inasmuch as opium is one of our few reliable remedies, and inasmuch as a large amount of capital may be involved in morphine determinations. A successful experiment to shorten the time of assay is a benefit for the manufacturing

chemist as well as for the analyst. It is scientifically just as valuable to test recently-published methods as to devise new ones.

Before proceeding with the descriptive part of this article, the writer desires to state that he is indebted to Professor Flückiger's method for opium-assay, published in the *Archiv der Pharmacie*, 1889 (reproduced in this JOURNAL, 1890, p. 14), for the general principles of a process which yielded very satisfactory results when *properly* applied to various galenical preparations of opium; satisfactory to such an extent that the two important quotations heading this contribution will need revision. A series of experiments, given below, furnish evidence that the sugar contained in Vinegar of Opium, U.S.P., does not increase to any extent the difficulty of estimating its percentage of morphine, and that it is possible for the chemist to obtain satisfactorily, in one short assay, 100 per cent. *pure*[1] morphine from the same opium, which yielded a morphine, loaded with impurities varying from ± 20 to ± 10 per cent.[2] by following the somewhat tedious methods of Squibb and of Stillwell.

Assay of Opium.—It should be remembered that in the assaying of opium the same accuracy cannot be obtained as, for instance, in a water analysis, nor is this the case with the determinations of many other alkaloids; thus we find the quantitative determination of atropine generally unsatisfactory; in some processes of assay strychnine splits up to some extent; coniine determinations vary, not unfrequently; assays of quinine are unreliable in the second decimal, etc. It is also known that absolute reliance should not be placed on a single morphine determination, since good chemists, experts in

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[1] It is perhaps not superfluous to here state that it seems to be of very little consequence in pharmaceutical assaying of opium whether or not the morphine contains minute traces of other opium alkaloids (codeine, thebaine, even narcotine) *when the balance is not capable of detecting their presence.*

[2] CORRECTIONS IN OPIUM ASSAYING.—How tenaciously impurities adhere to the morphine in Squibb's process is well known and convincingly shown in Notes I and II below. I copy the extremes observed thus far from my notes.

J. B. N.

I. *Crude Opium.*—Corrections in the crude morphine for impurities to be deducted: 19, 16, 14 and 11 per cent.

II. *Opium Preparations.*—Corrections on morphine to be deducted: 16, 14, 13, 12, 10, 7, 6, 5, 4, 3 and 2 per cent.

opium assaying, may obtain differences amounting to 0·4, 0·5 or 0·6 per cent.

If Flückiger's recent process be somewhat modified and conscientiously followed, I think it is destined to supersede the methods of the U. S. Pharmacopœia, Wainwright, Squibb, Stillwell, Cornwall, Dieterich, and of Pergers. The following embodies directions for thus modifying Flückiger's process for practical analytical work, and is used in the determinations given below:

Dry 10 gm. crude opium in a porcelain dish, at 100° C., for three hours, transfer to a dry mortar and pulverize. Put the powder, guarding against loss, into a filter of 2 inches diameter, pour slowly over the powder a mixture of 10 cc. ether and 10 cc. chloroform, cover well, and after the liquid has drained off, add 10 cc. chloroform. Drain the liquid, spread out the filter and dry its contents; then carefully transfer the washed and dried opium powder to a vial holding about 120 cc., [4 ounces]; add 100 cc. water; cork and frequently shake the vial during two hours. Now filter off 50 cc. into a small salt-mouth bottle, which is not as liable to break as an Erlenmeyer flask. Shake with a mixture of 10 cc. alcohol, of 94 per cent., 20 cc. pure ether, and 1 cc. ammonia water, of 10 per cent., for six hours.* Collect the morphine on a tared filter, wash with as little cold water as possible, or with a saturated solution of morphine, press the filter between blotting paper, afterwards dry at 100° to constant weight, and weigh between watch glasses. The weight multiplied by 20 gives the percentage of pure morphine.

Squibb's manner of removing the ether from the morphine is an improvement on Flückiger's method. If this be done by means of filtering paper, care must be taken that fine crystals are not taken up by capillary attraction; or the ether may be diluted with fresh ether, and removed with a pipette, which is more satisfactory than decanting the ethereal liquid from a salt-mouth bottle. This manipulation has the advantage of preventing the formation of a resinous layer of narcotine along the edge of the filter during the filtration.

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*Dieterich's unfavorable results are unfairly obtained. He exhibits in the *Helfenberger Annalen*, for 1889, a brilliant array of 54 comparative assays, of which not a single one is made according to Flückiger. The interested reader is referred to said *Annalen*, pages 94–96.

The following are fair examples, selected from a large number of comparative assays:

Number of Experiment.	Different lot Crude Opium.	Actual yield of Morphine in grams.	Calculated to per cent. pure Morphine.	Corrections.	With Lime-water, 1 : 100	Method.
	A.					
1	10 grams, ...	1·33	10·4	17·9	Partly insolub.	*Squibb*, 4 days.
2	5 grams, ...	0·53	10·6	None	Clear, colorless solution,	*Flückiger*, 1 day.
	B.					
3	10 grams, ...	1·11 1·08	9·3	16·6 14·2	Partly insolub.	*Squibb.*
4	5 grams powdered, . . 6 " crude, ...	0·577 0·571	9·5	None		*Flückiger.*
	C.					
5	5 grams powdered, . . 6 " crude, ...	0·542 0·540	9	None		*Flückiger.*
	C.					
6	10 grams crude, . . .	1·22	10·7	12		*Stillwell.*
	D.					
7	5 grams powdered, . . 6 " crude, ...	0·592 0·591	9·81	None	Clear, colorless, soluble.	*Flückiger.*
8	10 grams crude, . . .	1·308 1·302	11·6	11·2		*Squibb.*

Squibb's process (a modification of Flückiger's former one). Exhaustion with water rejects the resinous substances, and concentration to a small volume, with subsequent addition of alcohol, rejects starch, gum, sugar, etc. Squibb uses water slightly acidulated with diluted sulphuric acid (1 or 2 drops to 10 gm. opium), exhausting thoroughly. He differs from Flückiger in not using a fractional part of the filtrate, but all of it, and evaporates to a weight equal to that of the opium, and never to more than 1½ times the opium. His further directions are: Transfer to a flask and rinse with the

washings of the residue till the contents of the flask weigh not less than 1·6 nor more than 2·2 of the weight of the opium. Add half its weight of alcohol, shake, add ether (1·5 of the opium weight), shake, add ammonia (0·4 of the opium weight), and shake vigorously till morphine begins to crystallize. After 12 hours pour off the ethereal layer, wash the morphine with ether and dry.

Stillwell follows, in the main, Flückiger–Squibb, washing, however, with morphine saturated alcohol and similar water. He uses hot alcohol to purify the morphine.

The sampling of opium, as now done by different chemists, varies considerably. Since uniformity in this operation would result in preventing much annoyance, I propose the following plan which I have followed for some time and which yields good results: Take, with a knife, a small piece from the inside of every lump in the lot, usually one hundred, mix these pieces together, take 10 gm. for the moisture determination, dry the remainder, pulverize, and then take from this homogeneous mixture 5 gm. for another moisture determination (of the powder), and 10 gm. for the determination of morphine. Calculate the percentage of morphine in the crude opium taking into consideration the amount of moisture contained therein less the moisture contained in the powder. For example: crude opium contains 23·58 per cent., and the powder 3 per cent. of moisture. 5 gm. of the powder yielded 0·577 gm. morphine. Hence 5 gm. powder = 6·025 gm. crude opium, and 6·025 : 0·577 :: 100 : 9·5 per cent. of morphine. (Experiment 4).

Assay of galenical preparations of opium.—The percentage of active principle is calculated by weight. But liquid medicines are, in the United States, usually dispensed by measure, and always are, and will be so administered. Hence, I prefer measuring galenical preparations to weighing them, for analytical purposes.

In the subjoined table I give the *average* percentage of morphine as obtained from the preparation and compared with that found in the opium used. In such assays differences are sometimes found, either an excess or deficiency. Such a difference cannot actually exist, if the opium used for the preparation had been thoroughly exhausted and the dregs were free from morphine; but it must be remembered that no sample taken from opium fully represents the whole. However, I think that my method of sampling means a step nearer to the truth. When working on a large scale, it would be considered a waste of labor, time and money, to subject a large

lot of opium to powdering and then work up this powder into liquid preparations, and it is preferable, considered economically, that a slight discrepancy in the figures be allowed to appear on paper.

It should be mentioned also that in the following assays by the method given above no corrections for impurity in morphine were required; that the morphine thus obtained yielded in all cases with

Number of Experiments 21 in all.	Name of Preparation and Quantity Taken.	Actual Yield Morphine.	Percentage.	Average p.c. of Morphine found in the Opium used.	Assayed according to Squibb.		Number of Experiments 21 in all.
					Correction Required	Result calculat'd to per cent.	
		gm.					
1	Acetum opii, 25 cc.	0·314	1·25	100		Failure.	15
	" "	0·306	1·22	100			16
2	" "	0·314	1·25	100			
3	Fluid extract, 25 cc.	0·382 0·400	1·6	100	Not done	Not done	
4	" 50 cc.	0·700	1·4		5 p. c.	1·42 p.c.	17
5	" "	0·869	1·73	100	2·4 "	1·74 "	18
6	" "	0·699	1·39		3 "	1·29 "	19
7	" 25 cc.	0·562 0·579	2·24 2·31	?	Not done	Not done	
8	Tincture, 50 cc.	0·534	1·06		12 p. c.	1·00 p.c.	20
9	" "	0·638	1·27	100	13 "	1·22 "	21
10	Laudanum, 50 cc.	0·562 0·579	2·24 2·31	?		Discontinued.	
11	Extract, 2 gram	0·43	21·5				
12	" "	0·364 0·358	18·2 18·				
13	" "	0·415 0·409	20·75 20·45	100			
14	" "	0·365 0·357	18·25	?			

100 parts of lime water clear and colorless solutions, only the solution of morphine obtained in No. 8 having some color; also that the preparations assayed were made by the writer, with the exception of Nos. 7, 8, 9, 10 and 14, which had been made by others. Where

two assays are given in the table braced together under one number, they are duplicate assays of the same preparation; No. 2 is the assay, made at a different time, of the vinegar examined under No. 1.

Flückiger's process, for the determination of morphine in crude opium, 1889, applied to acetum opii, solid and fluid extracts, tinctures and wines of opium.—When Professor Flückiger published his method for the determination of morphine in crude opium, it appeared to the writer that it could be applied successfully to the commercial so-called solid and fluid extracts of opium.

To obtain pure morphine as a result of an analysis of fluid extract of opium, was one of the *pia vota* of pharmaceutical assaying. I suppose that the interested reader is familiar with the disappointments of the older processes, the time they absorb, etc. (Compare Lyons' Manual of Pharmaceutical Assaying, 1886, and the admirable Digest of Criticisms on the U. S. P., i and ii, pages 116 and 245.)

Flückiger's process, modified properly for fluid extracts, etc., will be a delight to the analyst and a considerable saving of time. The short time in which crystallization is effected, is decidedly in favor of obtaining pure morphine, while processes with slow crystallization yield the alkaloid impure; if, when following Flückiger's process, crystallization be delayed, the morphine will be impure.

Method.—50 cc. of fluid extract, tincture or wine of opium are evaporated in a waterbath to two-thirds of the volume, or a little less. Acetum opii is evaporated to dryness, and the residue treated as a solid extract. The residue is transferred to a separator, using as little water to wash as possible. Agitate with 10 cc. of a mixture of equal volumes of ether and chloroform. This is separated and rejected, and the operation is repeated with a fresh portion of ether and chloroform (the ether must be free from alcohol). The fluid is now filtered through a moist filter of two inches diameter. The filter is washed with the rinsings of the separator; no unnecessary quantity of water to be used. Care is needed that the filter does not dry out. The total fluid, of about the same volume as the original fluid, is collected in a wide-mouthed bottle of 100 cc. capacity with round shoulders (an Erlenmeyer flask being too fragile). Then add 10 cc. alcohol of 94 per cent., 20 cc. ether and 1 (one) cc. ammonia of 0·96 s. gr.; cork; agitate very frequently during six hours; set aside in a cool place over night; absorb the ether as stated above; collect the fine crystals with the filtrate on a tared filter in the proper way; wash them with

the least quantity of cold water; press the filter with the morphine, between blotting paper; dry at 100° C. to constant weight; weigh between watch crystals and calculate the result to percentage. The assay will consume only one day's time.

Solid extracts will have to be dissolved in water and treated as above. I take two grams, dissolve in 50 cc., water and obtain the most satisfactory results with 1 (one) cc. ammonia.

I am of the opinion that a dilute fluid and the least possible quantity of ammonia is to be preferred to a concentrated fluid and an excess of ammonia as used in other processes of morphine assaying. This process compares favorably with the Helfenberger method, *and withi ts many weighings* (*Helfenberger Annalen*). No second assay is required of the morphine itself. The simplicity of operation and the satisfactory quantitative results are especially to be commended. The acidity of the wine, used in vinum opii, has to regulate the amount of ammonia, which must be slightly in excess; usually 2 cc. answered the purpose.

LABORATORY OF PARKE, DAVIS & CO., DETROIT, July, 1890.

ARTIFICIAL AND NATURAL DIGESTIONS.[1]

BY A. S. LEA.

The following factors, present in normal digestion, are absent in artificial digestion experiments as usually performed in flasks and beakers: (1) Constant movement of the contents; (2) constant removal of digestive products; (3) continuous additions of fresh portions of digestive fluid. In the present experiments, an apparatus was employed which tends to obviate these disadvantages. The artificial digestion is carried out not in a flask, but in a tube of parchment paper, kept in constant up and down movement by connecting it to a motor; this tube is suspended in a cylindrical glass vessel, filled with the same mixture as that contained in the tube, but minus any ferment; an outer cylindrical glass vessel is filled with water kept at the necessary constant temperature. By this means, two of the more important conditions under which natural digestion takes place may be imitated, namely, continuous movement, and removal by dialysis of digestive products.

The first question investigated was the digestion of starch by

[1] *J. Physiol.*, **11**, 226–263. Reprinted from *Jour. Chem. Soc.*, 1890, p. 536.

saliva; the great contrast between natural and artificial digestion of starch is the appearance of large quantities of dextrin in the latter case (opinions, however, differ as to the relative amounts of sugar and dextrin formed), whilst in the stomach and intestines mere traces of the dextrins are discoverable. Nothwithstanding imperfections in the present method of experimentation, which are freely admitted, the contrast between a digestion carried on in the moving dialyser and in a flask is very marked; the iodine reaction of starch or dextrin disappears first in the contents of the dialyser; in prolonged digestions the contents of the dialyser remain clear and more free from putrefactive organisms than those of the flask, and the proportion of dextrin present is less in the dialyser than in the flask. This last point may be illustrated by the following table:

	Duration of experiment in hours.	Strength of starch in solution per cent.	Dextrin per cent. in dialyser.	Maltose per cent. in dialyser.	Maltose per cent. in dialysate.	Dextrin per cent. in flask.	Maltose per cent. in flask.
1	6	0·4	7·67	—	—	15·23	—
2	22	2·4	8·58	—	—	14·16	84·23
3	21	4·23	16·78	—	—	36·62	61·81
4	68	4·23	8·48	—	—	35·70	62·33
5	18	0.43	10·31	12·42	76·67	—	—
6	48	4·18	12·61	14·20	71·15	—	—
7	90	3·35	4·29	3·06	91·18	—	—

The conclusions drawn from these and similar experiments are as follows:

When the digestion of starch by saliva is carried out under conditions which ensure a very considerable removal of the products (maltose) as they are formed, then:

(1) The *rate* at which the digestion takes place is increased.

(2) The total *amount* of starch converted into sugar is much greater, and the residue of dextrin is much less, than under conditions, otherwise similar, when the products are not removed.

(3) The influence of the removal of digestion products on the relative amounts of dextrin and maltose formed is least marked when the starch solution is dilute.

(4) These results justify the assumption that in the alimentary canal starch is completely converted into sugar before absorption.

(5) The experiments afford no evidence that any sugar other than maltose is formed by the action of saliva on starch.

The next series of experiments dealt with the pancreatic digestion of proteïds; here the occurrence of an insoluble bye-product (anti-albumid) is believed to be due to the imperfection of the method of artificial digestion, and probably does not occur in natural digestion; the question, however, which was specially investigated was the occurrence of leucine and tyrosine. Kühne has already stated that these amido-acids are formed in natural as well as in artificial pancreatic digestion, but careful quantitative experiments do not seem to have been made, although it may be roughly stated that less of these materials are found in the intestines than in a flask. This may be due to one of two causes; either they are normally formed in large amount and then rapidly absorbed, or else they are formed in only small amount. By the help of the digesting dialyser, combined with the examination of the intestinal contents of animals, it was hoped in the present research to elucidate this question. A few typical experiments are described in detail and the following conclusions drawn: (1) The undigested residue in a flask digestion is always greater than that of a dialyser digestion, other conditions being the same; (2) the amount of leucine and tyrosine formed in a flask digestion is always greater than in a dialyser digestion, other conditions being the same. The amount formed in a dialyser digestion is, however, always considerable, and it is possible that the amount formed is less than in a flask digestion, because the peptones from which they originate are continually dialysing out. Leucine and tyrosine were also found in not inconsiderable quantities in the intestines of the animals examined, not merely in microscopic amounts, as some previous observers seem to imply.

The paper concludes with remarks of a theoretical nature on the function of the amido-acids formed in plants and in animals. It is regarded as inconceivable that the animal, like the vegetable organism, should construct its proteïds from the nitrogen contained in the amido-acids, and their importance is likened to that of the inorganic salts and extractives contained in beef-tea, or other meat extract. We do not know what part these play exactly in the total processes of tissue-metabolism, but we do know that the salts are in some way essential, and that the extractives are an extremely important accessory to that metabolism.

Experiments on the pancreatic digestion of starch are in progress.

The term *zymolysis* is suggested as a convenient one to denote generally the changes produced by enzymes or unorganized ferments.

RESEARCHES ON THE GERMINATION OF SOME OF THE GRAMINEÆ.[1]

By Horace T. Brown and G. Harris Morris.

The investigation was undertaken with a view of throwing some light upon the complex metabolic processes which take place during the germination of seeds. The authors during the progress of the inquiry have examined the seeds of a great number of grasses, but this, the first part of their paper, is confined almost entirely to a consideration of the changes which take place in barley, during the early periods of its growth.

In recording the visible changes which occur in the seed during germination, it is shown that a disintegration and dissolution of the cell-walls of the endosperm always precede any attack upon the cell contents. This breaking down of the cell-wall is shown in a subsequent portion of the paper to depend on the production during germination of a special cellulose-dissolving or "cyto-hydrolytic enzyme," which, like diastase, is soluble. The action of this enzyme on the cell-walls of some kind of vegetable parenchyma is very energetic. The physiological importance of this cyto-hydrolyst is very great, for, owing to the non-diffusible nature of the amylo-hydrolytic enzyme, diastase, the previous breaking down of the cell-wall is a necessary prelude to the dissolution of the contained starch-granules.

The authors show that the appearance of the cyto- and amylo-hydrolysts is due to a specialized secretory function of the layer of columnar epithelium which covers the outer surface of the scutellum. It has hitherto been considered that the functions of this epithelium was exclusively that of an absorptive tissue; its absorptive as compared with its secretory functions are, however, of quite secondary importance.

The natural food material, *starch*, does not appear to have any special power of stimulating the cells of the epithelium to increased secretion of a diastase, but the flow of diastase and of the cyto-hydrolytic enzyme from these cells is affected in a very remarkable manner by the presence of certain carbohydrates. Providing the

[1] Read before the Chemical Society, London, April 3; abstract prepared from *Chemical News*, April 25, 1890, by G. M. Beringer. The paper printed in full in *Journal of the Chemical Society*, June, occupies seventy pages.

carbohydrate is one which is readily assimilable by the embryo, such as cane-sugar or maltose, secretion of ferment is checked or even entirely inhibited. No such inhibitory action is, however, produced by such substances as mannitol and milk-sugar, which are entirely without nutritive value. The authors' experiments in this direction point to the secretion of the amylo-hydrolytic and cyto-hydrolytic enzymes as being to some extent *starvation phenomena.* The power of secretion possessed by the epithelium is in some way or other so adapted to the requirements of the young plants as to be only exercised when the supply of tissue-forming carbon compounds begins to fail.

The authors confirm the important generalization of Sachs that the relation of the embryo to the endosperm is that of parasite to host, and they have availed themselves of this relation by cultivating the embryo upon suitable media after separating it from its endosperm, and in this way they have obtained information with regard to the secretory powers of the embryo and the chemical modifications of its absorbed nutriment, which it would have been impossible to obtain by any other means.

The results of cultivating the excised embryos upon various nutrient solutions, more especially of the carbohydrates, are recorded, and it is shown that whilst cane-sugar, invert-sugar, dextrose, lævulose, maltose, raffinose, galactose and glycerol have all more or less nutrient value, milk-sugar and mannitol do not in any way contribute to the growth of tissue in the young plant. Of all the substances tried, cane-sugar has by far the greatest nutritive power. Maltose, although the natural food of the embryo when attached to its endosperm, is decidedly inferior in this respect to cane-sugar. This is shown to be due to the fact that maltose directly it is absorbed by the growing embryo becomes transformed into cane-sugar by the living cells, and in this form is passed from cell to cell. When cane-sugar is supplied ready formed to the young plantlet there is manifestly a saving of energy to the living cell which receives its nutriment in a form in which it is directly available for its requirements.

An examination of the sugars produced during the germination and of their mode of distribution in the grain have convinced the authors that the transformed starch of the endosperm is absorbed by the embryo in the form of maltose; and that the seat of production

of the cane-sugar which germinated grain contains is the tissues of the embryo itself.

In the discussion following the reading of this interesting paper, Mr. Thiselton Dyer said that botanists had already made some progress in localizing enzymes; thus Professor Marshall Ward had shown that the enzyme which effects the liberation of the coloring matter from the glucoside in Persian berries is located in the raphe; and it had long been known that emulsin was not distributed throughout the bitter almond. After referring to the distinction between animals and plants, he said that the plant was similar to the seed, the bud corresponding to the embryo, and the woody shoot to the endosperm. Baranezky had shown that a diastase is omnipresent in plants, and there could be little doubt that it would be found that an enzyme capable of attacking cellulose was equally so.

Professor Marshall Ward pointed out that in the seeds of the Gramineæ, Cyperaceæ and other families of plants there is a peculiar layer of cells, from one to three or more deep, surrounding the starchy endosperm and distinguished from the latter by containing no starch but relatively large quantities of proteids; this layer belongs to the endosperm, but as the seed ripens the cells store special proteids instead of the starch grains which predominate in the other endosperm cells.

In the oat there is such a layer, one cell deep, and it has been shown that, during germination, the dissolution of the starch and the cell-walls of the starch containing cells begins near the surface of this layer, which itself persists and the cells of which take up food and undergo changes so like those of excreting cells, that it was concluded that they excrete the diastatic enzyme. Haberlandt declares that when starch-grains are placed in contact with a piece of this layer kept moist and at proper temperatures, the grains even of the resistent potato starch are corroded as on germination; whereas control experiments, where all conditions are the same except the presence of the cells of the proteid layer, showed no such corrosion.

The proof that a cellulose dissolving enzyme exists in barley is borne out by various recent researches and by Wortmann's researches on the behavior of bacteria in a mixture of starch and proteids. Wortmann proved that so long as the bacteria were fed

with proteids they refused to excrete the diastatic enzyme which they produce in abundance when only carbohydrates are at their disposal. Similar proteid layers exist in the seeds of buckwheat and in the tubers of some potatoes.

Professor Green said that in the case of the date stone his observations led him to believe that the enzyme was independent of the endosperm, and that probably it was located in the epithelial layer, but in castor-oil seeds not only the embryo but also the endosperm cells appeared to be possessed of vitality, the fatty matter in the latter undergoing change even when not subject to the action of the embryo; probably the enzyme was present in the form of an enzymogen, as extracts of the seeds were rendered active by acids.

CLOVE CULTURE IN ZANZIBAR.[1]

Zanzibar is noted for being the principal source of the world's supply of cloves, and a report on the cultivation of this article of domestic economy may prove of interest.

When speaking of Zanzibar, we include the islands of Zanzibar and Pemba, three-fourths of the entire crop of cloves being produced in Pemba. Those grown on the island of Zanzibar are reckoned of superior quality and command the better price, but this is probably due to the fact that the owners reside here, and can thus give their affairs the benefit of direct supervision.

Certainly the conditions for their successful cultivation are most favorable at Pemba, where the rainfall exceeds that of Zanzibar, but the management being left to careless overseers, the result is the cloves are imperfectly cured and (but little care being observed in handling) are frequently marketed in an inferior condition.

The clove tree was first introduced into this country by the then Sultan, Seyed Said bin Sultan, about the year 1830, since which time its cultivation has gradually extended, until it is now the chief industry of the islands.

The industry received a check in 1872, the date of the great hurricane. At least nine-tenths of the trees were destroyed at that time, so the larger part of those now standing are of new growth.

A peculiarity of the clove tree is that every part is aromatic, but

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[1] Report of Consul Pratt. Reprinted from the *Oil, Paint and Drug Reporter.*

the greatest strength is found in the bud, which is the "clove" of commerce. The finest quality of cloves are dark brown in color, with full, perfect heads, free from moisture.

In the cultivation of the clove, the first thing to be done is the starting of the shoot. The seeds are planted in long trenches and are kept well watered until after sprouting. In the course of forty days the shoots appear above ground. They are carefully watered and looked after for the space of two years, when they should be about 3 feet in height. They are then transplanted, being set about 30 feet apart, and are kept watered till they become well rooted. From this time on the young trees require only ordinary care, though the best results are obtained when the ground about the trees is well worked over and kept free from weeds.

The growth of the tree is very slow, and five or six years are required for it to come into bearing, at which time it is about the size of an ordinary pear tree and is usually very shapely. It is a pretty sight to see a young plantation just coming into bearing. The leaves, of various shades of green tinged with red, serve to set off the clusters of dull red clove buds.

As soon as the buds are fully formed and assume this reddish color the harvesting commences, and is prosecuted for fully six months at intervals, since the buds do not form simultaneously, but at odd times throughout the whole period. The limbs of the tree being very brittle, a peculiar four-sided ladder is brought into requisition, and the harvesting proceeds apace.

As fast as collected, the buds are spread out in the sun, until they assume a brownish color, when they are put in the storehouse and are ready for market.

A ten-year-old plantation should produce an average of 20 pounds of cloves to a tree. Trees of twenty years frequently produce upwards of 100 pounds each.

The present season, commencing with July, 1889, is very favorable, and the crop will exceed that of any previous season. It will, in all probability, amount to 13,000,000 pounds, averaging a local value of 10 cents per pound.

The Sultan derives no inconsiderable portion of his revenue from this source, since the duty is levied at 30 per cent. *ad valorem*, thus placing to the Sultan's credit for the present year nearly, if not quite, $400,000.

Besides the clove buds, the stems are also gathered, and form an article of commerce, commanding about one-fifth of the price of cloves and having about the same percentage of strength. To this circumstance is due the fact that ground clove can frequently be purchased in the market at a lower price than whole cloves.

For the past fifteen years the cultivation of cloves has been the chief occupation of the Arab planters and has always netted good returns. It seems probable that it will continue to be a profitable crop, since the consumption of the article appears to keep pace with the inevitable increase of production.

Up to the present time the plantations have been worked with slave labor at comparatively small expense; but with stoppage of slave supplies from the mainland, great difficulty will be experienced by the planters during harvest time. One result will be an increase in expenses; but what the planters have most to fear is that the curtailment of the labor supply will entail a direct loss by rendering it impossible to harvest the crop until after it has blossomed, when it would be unfit for the uses of commerce.

ISOCINNAMIC ACID IN THE COCAINE ALKALOIDS.[1]

By C. Liebermann.

The decomposition-products of the alkaloids accompanying cocaine contain isocinnamic acid, which can be isolated in the following manner: The crude product obtained by decomposing the alkaloids (38 kilos.) with hydrochloric acid is filtered from the solid acids, and the filtrate extracted with ether; on evaporating the ether there remains a semi-solid mass (700–800 grams). This residue is filtered to separate the solid acids, which consist principally of cinnamic acid, together with small quantities of α- and β-truxillic acids and benzoic acid, the oily filtrate is kept for some days at 0°, and again filtered from the crystals which are deposited. The filtrate (300–400 grams) is dissolved in cold sodium carbonate, the solution shaken with ether to remove ethereal salts which may be present, and the acids reprecipitated. The acid mixture is then extracted with warm light petroleum, and the solution evaporated. The crude isocinnamic acid (about 120 grams), obtained in this way in a crystalline condition, is further purified and separated from

[1] *Ber.*, **23**, 141–156. Reprinted from *Jour. Chem. Soc.*, May, p. 494.

cinnamic acid by repeatedly extracting it with small quantities of light petroleum, in which cinnamic acid is only very sparingly (0·095 in 100), isocinnamic acid, on the other hand, readily (17 in 100) soluble. It is then converted into the calcium salt, and the latter extracted with water, in which calcium cinnamate is only very sparingly (1 in 430), but calcium isocinnamate readily (1 in 8) soluble. These two processes are repeated many times until the calcium salt obtained is completely soluble in a small quantity of cold water. The salt is then decomposed with hydrochloric acid, and the acid, which is precipitated as an oil, extracted with ether, and recrystallized from light petroleum.

Isocinnamic acid, $C_9H_8O_2$, separates from cold light petroleum in transparent crystals, melting at 45–47°; if the acid be coarsely powdered and treated with a small quantity of cold light petroleum in such a way that the more compact crystals remain undissolved, the latter melt at 57°, which is the true melting point of the acid. It is very readily soluble in light petroleum, carbon bisulphide, alcohol and all ordinary solvents, except water, whereas cinnamic acid and atropic acid are only sparingly soluble in light petroleum and carbon bisulphide. Molecular weight determinations by Raoult's method, in glacial acetic acid solution, gave results in accordance with the molecular formula given above; on evaporating the acetic acid solution on the water-bath, the isocinnamic acid was deposited unchanged. It is immediately oxidized by potassium permanganate in cold sodium carbonate solution, with formation of benzaldehyde, but it does not reduce Fehling's solution, and it is not changed by boiling alcoholic potash. Crystalline measurements showed that this acid is not identical either with cinnamic acid or with atropic acid.

The *calcium* salt $(C_9H_7O_2)_2Ca + 3H_2O$, separates from cold water in crystals which effloresce on exposure to the air; the salt then contains 3 mols. H_2O, which are expelled at 125°. The ***barium*** salt is not quite so readily soluble in water as the calcium salt. The *silver* salt, $C_9H_7O_2Ag$, is colorless, and undergoes no change on exposure to light. In aqueous solutions of the ammonium salt, cobalt, manganese and zinc acetate produce no precipitation, but copper acetate gives a green, and mercuric nitrate a colorless precipitate. The *methyl* salt is a colorless liquid.

Isocinnamic acid begins to boil at 265°, but the boiling point

gradually rises to 300°. The distillate consists principally of cinnamic acid (90 per cent.), but on prolonged boiling cinnamene is also produced. Isocinnamic acid is almost quantitatively converted into cinnamic acid when it is boiled for about a minute under the ordinary pressure.

Hydrocinnamic acid (m. p. 48°) is obtained when isocinnamic acid is dissolved in soda, and the solution treated in the cold with sodium amalgam of 3 per cent.; the yield is almost quantitative. When isocinnamic acid is treated with bromine in cold carbon bisulphide solution, it is converted into phenyl-$\alpha\beta$-dibromopropionic acid (m. p. 196°); the yield is on the average 45–50 per cent. of the acid employed. Methyl isocinnamate, under the same conditions, is converted into methyl phenyl-$\alpha\beta$-dibromopropionate (m. p. 117°). Isocinnamic acid is not changed when treated with iodine in cold carbon bisulphide solution, but on warming it is converted into cinnamic acid.

Isocinnamic acid dissolves almost completely in hydrobromic acid, and in about 24 hours it is completely converted into phenyl-β-bromopropionic acid (m. p. 137°); it is completely converted into phenyl-β-chloropropionic acid (m. p. 126°) when it is dissolved in a saturated solution of hydrogen chloride in glacial acetic acid and the solution kept for three to four days, whereas cinnamic acid under the same conditions is only very partially converted into the same additive compound.

Isocinnamic acid and cinnamic acid both require the same quantity (4 mols.) of potassium permanganate for complete oxidation to benzoic acid.

Isocinnamic acid occurs in storax; from about 2 kilos. of crude cinnamic acid from this source, the author isolated about 2 grams of pure isocinnamic acid by the method described above.

The relationship existing between cinnamic acid and isocinnamic acid can be explained by accepting Wislicenus' hypothesis; in accordance with this view, the acids would have the constitution

$$\begin{matrix} Ph\cdot C\cdot H \\ \| \\ COOH\cdot C\cdot H \end{matrix} \quad \text{and} \quad \begin{matrix} Ph\cdot C\cdot H \\ \| \\ H\cdot C\cdot COOH \end{matrix} \quad \text{respectively.}$$

The behavior of isocinnamic acid is in complete accordance with the view that it is a labile form of cinnamic acid.

ABSTRACTS FROM THE FRENCH JOURNALS.

Translated for the AMERICAN JOURNAL OF PHARMACY.

AMORPHOUS AND CRYSTALLIZED DIGITALINS.—The *Société de Pharmacie de Paris* has appointed a commission to examine into the composition and decide as to the relative strength of the digitalins, a matter which has long remained in a confused condition. At the *séance* of May 7, M. P. Vigier said: "Recent researches which appear to establish that amorphous, chloroformic digitalin, and the crystallized digitalin of the Codex, have the same physiological activity, can only create uncertainty among pharmacists, for they know that the Codex allows one mgm. as the dose for amorphous, and one-quarter mgm. as the dose of crystallized digitalin. The recent researches were made with an amorphous, chloroformic digitalin of a manufacture not indicated; and it is certain that all makers do not produce an amorphous digitalin which is as active as the crystallized drug." M. Vigier approved of the appointing of the commission referred to, and thought that crystallized digitalin should alone be admitted into the Codex.

IS EXALGINE A DANGEROUS REMEDY?—In a long article in the *Rev. méd. de la Suisse rom.*, Prof. Prevost made the following remark: "Methylacetanilid is a more dangerous substance than antipyrine. It is also more dangerous than acetanilid, its solubility considered, and it is well to be circumspect in its use, especially until a riper experience has more definitely decided as to the kind of accidents to which it may give rise." To this, Dr. Bardet replies (Nouv. Rem., June 24), that in the single case of poisoning cited by Dr. Prevost the symptoms were caused by the prolonged use of exalgine in doses of 40 cgm., 3 times a day, and the obstinate constipation of the patient. Dr. Bardet wrote to Dr. Lloyd Jones (who attended the case) and learned that the doctor attributed the result to "an abnormal constipation." He said, furthermore: "I have frequently recommended exalgine and have a very favorable opinion as to its analgesic qualities." M. Bardet added that exalgine had now been in use for eighteen months and the accident cited was the only one to be found in medical literature. Like all active medicaments it should, of course, be used prudently; but if we are to renounce it as dangerous, we must also give up the use of all medicaments capable of producing toxic effects.

SOLUTIONS OF BORATE OF SODIUM AND COCAINE.—At a meeting of the *Société de Pharmacie*, M. Julliard advised the addition of a small quantity of glycerin to these solutions to prevent the precipitate caused by the alkalinity of the sodic salt. M. Patein thought the salt was not alkaline, but that alkalinity was developed by solution, M. Grimbert said that the glycerin did not re-dissolve the cocaine, but caused a well-known acid reaction in the borate of sodium. The members finally agreed with M. Thibaut that it was not worth while to resort to the use of glycerin in these solutions, as the precipitated cocaine would easily re-dissolve on the addition of a small quantity of boric acid.

ESTIMATION OF ASH IN GLYCERIN.—M. Vizern proposes the following method as giving more exact results than the processes usually employed. Weigh 10 gm. of glycerin in a porcelain capsule and burn it so as to obtain a charred mass, which should be moistened with distilled water. Place upon a filter and wash several times with small quantities of water, saving all the liquids. Then calcine the filtrate in a platinum capsule. The charred mass, being now deprived of nearly all of its salts, burns well. After cooling, pour in the filtered liquors and evaporate in a bath, being particular to avoid ebullition. After desiccation the temperature should be raised so as to drive off all the water.—*Répert. de Phar.*, June.

A NEW COLORANT FROM GRAPES.—According to M. Carles (*Jour. de Phar. et de Chim.*, June 1), such a substance has lately been offered in the market. The coloring matter of grapes consists, he says, of a blue, a yellow and a red, which are soluble in wines, and in sugar and water to which a small quantity of alcohol has been added. The blue portion of the combined pigment becomes slowly insoluble and passes into the lees. In this state it is still soluble in strong alcoholic solutions and reddens under treatment with acids. With tartaric acid it gives a very beautiful color, and it is to this colorant that M. Carles refers as having become a commercial article. It appears to be used in coloring white wines and raisin wines. But in a few months the colorant decomposes and the liquid becomes turbid. The addition of gum simply restores to the preparation its white color.

STERILIZATION OF CATGUT BY HEAT.—M. Larochette, a Lyons pharmacist, says (*Lyon Médical*) that the operation of heating catgut with oil does little more than fry that substance. His method is

to heat it in a Wiesnegg stove. If the latter apparatus is not at hand, it is sufficient to use a large, wide-mouthed jar, into which the gut and cotton wadding are introduced, the jar being then closed tightly with a cork. Three openings should be made in this "bottle stove," one for the introduction of a thermometer, one for a tube to conduct the vapor from the interior, and a third to hold Roux's temperature regulator. Moderate heat must be used at first, the temperature being gradually carried to 140° C., when the catgut becomes asceptic. The gut is removed with forceps previously sterilized, and should be immediately placed in olive oil, which has been previously boiled, and to which has been added 10 to 100 of its weight of phenic acid. It is not thought necessary to begin by removing the fat from the catgut, as it is not the presence of fat, but of humidity which alters the cord during the operation of heating.—*Répert. de Phar.*, July 10.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

The Indiana Pharmaceutical Association assembled at Lake Maxinkuckee, July 8, at its ninth annual meeting; Vice-President Bryant in the Chair. Reports of committees and of the executive officers were received and discussed, the most important one being on legislation and the draft of a pharmacy law, which will be presented to the next Legislature, and it was stated with better prospects for its passage than in former years. A paper by E. G. Eberhardt on *spirit of nitrous ether* recommends a process for its preparation in which sawdust is used. For the preparation of *pure mercurous iodide*, J. K. Lilly recommended precipitation from dilute solutions of mercurous nitrate and potassium iodide. Professor Hurty was elected President for the current year, and the Association finally adjourned to meet again in Indianapolis on the second Tuesday of May, 1891.

The Kentucky Pharmaceutical Association held its thirteenth annual meeting in Richmond, May 21, and listened to the address by the President, the reports of committees, and to the reading of several papers. President for the current year is J. J. Brooks, Richmond. The next meeting will be held at Frankfort.

The Massachusetts State Pharmaceutical Association convened at its ninth annual meeting in Brittain Hall in Haverhill, June 18 to 20; President Snow in the Chair. Mayor Burnham welcomed the visitors to the city. The President's address, reports by the Secretary, the Treasurer and the several committees, also a number of valuable papers prepared by members occupied the attention of the meeting. Percolation and maceration, and the advantages of each in special cases formed the subject of one of the papers read by Professor Patch, while in another one simple tests were given for detecting adulterations in a number of pharmacopœial drugs. Advance in pharmacy was the subject

of a paper by Professor Pengra; the size of drops of different liquids, by J. W. Colcord; the preparation of medicated waters, by D. G. Benedict; on co-operation among pharmacists, by S. A. D. Sheppard; comparison of upward and downward percolation, by Prof. Patch; iron solutions, by B. Scoville; Preston salts, by W. W. Bartlet; use of the microscope, by Prof. Pengra; formulas for perfumes, by L. H. Leavitt. E. C. Marshall, Charlestown, was elected President for the current year; J. W. Colcord, Boston, Secretary, and F. B. Nichols, Salem, Treasurer. The next meeting will be held in Boston in June, 1891.

The New Jersey Pharmaceutical Association met at its twentieth annual meeting in Jersey City, May 28. Mayor O. Cleveland welcomed the association to the city. The address by President Thorn related mainly to business affairs, to the qualification of apprentices, and to legislation. Reports were presented by the officers, committees, and the delegations to the Pharmacopœial Convention and to the pharmaceutical associations of neighboring states. A number of papers were read by P. E. Hommell on the coloring matter for compound spirit of lavender and compound tincture of cardamom; on the uselessness of pharmacopœial wines; on soap liniment; and on the use of waxed paper for Seidlitz powders; on pure extract of liquorice, by C. R. Paddock; and a paper on soda water, by F. B. Kilmer. The officers for the current year are: President, Maxwell Abernethy, Jersey City; Secretary, C. F. Dare, Bridgeton, and Treasurer, W. M. Townley, Newark. The next meeting will be held at Trenton on the fourth Wednesday of May, 1891.

The New York State Pharmaceutical Association held its twelfth annual meeting at Auburn; President Gregory in the Chair. The first session was opened with an address of welcome by Mr. Woodruff, President of the Board of Trade, after which the President delivered his annual address. The reports of the Secretary and Treasurer showed a membership of 762, and a cash balance on hand amounting to $1,101. Among the reports of committees those on adulterations, on new remedies, and on county organizations attracted general interest, and the report on the President's address elicited much discussion, resulting in the adoption of measures calculated to increase the usefulness of the association. Among the papers were the following: on oleate of mercury, and on phosphoric acid, by Dr. Huested; on fruit syrups, by C. H. Gauss; and on the use of compressed carbonic acid for making soda water, by Dr. Gregory. Professor W. G. Gregory was re-elected President; C. W. Holmes, Elmira, Secretary, and C. H. Butler, Oswego, Treasurer. Bluff Point on Lake Champlain was selected for holding the next annual meeting on June 25, 1891. The Local Secretary is John H. Smith, of Plattsburgh.

The Ohio Pharmaceutical Association was convened at its twelfth annual meeting in Memorial Hall, Toledo, June 10, President Sherwood in the Chair, and was welcomed with an address by Mayor Hamilton. The President's address and the reports of the other officers and of committees occupied the association during the first two sessions. Among the papers read were the following:

On Salicylic Acid, by J. G. Spenzer and J. D. Lisle. Both essays give the results of the examination of commercial specimens, Mr. Lisle having examined four samples, while Mr. Spenzer's investigation embraced fourteen

samples of the synthetical and two of the natural acid, the result being that the commercial acid is of good quality, contains mere traces of phenol, and is free from coarser adulterations. The largest amount of phenol was determined by Mr. Lisle, by calorimetric estimation, at 0·328 per cent.; the odor of phenol could not be detected in any of the samples.

Cocaine hydrochloride, by J. G. Spenzer. Thirty-seven commercial samples of the salt were examined, according to condition, color, odor, taste and by eighteen additional tests, the author summarizing his results by the statement that the crystalline cocaine hydrochloride is of the better quality, and fully supports the good authority who have repeatedly advocated the use of only the crystalline form; also, some American cocaine hydrochloride is equal to any foreign make in purity.

Syrup of iron, quinine and strychnine.—W. Simonson proposes the following formula, which yields a syrup containing in the pint 132 grains of alkaloids and 128 grains of ferrous phosphate. Take of

	Grs.
Iron, fine wire, in small pieces,	62
Phosphoric acid (50 per cent.)	800
Quinine, dried at 100° C.,	128
Strychnine,	4
Sugar,	12 oz. (av.)

Distilled water a sufficient quantity.

Dissolve the iron in 650 grs. of the phosphoric acid diluted with one fluidounce of water, heating the mixture gradually from 50° C. to its boiling point. Dissolve the quinine and strychnine in 150 grs. of the phosphoric acid diluted with four fluidounces of water, heating to 60°–80° C.; filter through a small filter and pass sufficient water through the filter to make six fluidounces. Heat this solution to 80° C., and in it dissolve the sugar quickly by rapid and constant stirring. Strain the solution through a small strainer and pass sufficient water through the strainer to make thirteen fluidounces. Filter into this, using a small plaited filter, the iron solution as soon as it is finished, and pass sufficient water through the filter to make sixteen fluidounces. Having mixed the filtrates thoroughly, store the syrup in bottles, which should be filled completely.

The election of officers resulted in the choice of F. N. Heath, Toledo, for President; L. C. Hopp, Cleveland, Secretary, and F. A. Kantz, Cincinnati, Treasurer. Dayton was selected for holding the next anuual meeting, June 9, 1891. J. G. Spengler was elected Local Secretary.

The Oregon Pharmaceutical Association was organized in the city of Portland, June 10 and 11, when a constitution and by-laws were adopted, and the draft of a pharmacy law was considered and a committee appointed to present the same to the legislature. A paper was read by Dr. Cottel, reviewing a number of prescriptions as to the preparations ordered by physicians. M. M. Davis, Jaquima City, was elected President; H. D. Dietrich, Portland, Secretary, and L. G. Clarke, Portland, Treasurer. The first annual meeting will be held in Portland on the second Tuesday of June, 1891.

The Washington State Pharmaceutical Association held its first meeting since the organization (see April number, p. 200) at Tacoma, May 12. The prin-

cipal business attended to was the consideration of the pharmacy law, which had been presented to the Senate, was amended and passed by that body, but failed in the House for want of time before final adjournment. Several amendments were proposed, and the bill was again entrusted to a special committee for presentation to the next legislature. A. C. Clark, Olympia, was re-elected President, and W. St. John, Tacoma, was elected Secretary and Treasurer. The Local Secretary for the next meeting is D. O. Woodworth, of Ellensburgh, at which place the association will convene May 11, 1891.

The following printed Proceedings of State Pharmaceutical Associations have been received:

Alabama.—Ninth annual meeting. pp. 73. See July number, p. 374.—The pamphlet contains the following papers read at the meeting: Antipyrine, by A. E. Brown; Extemporaneous Pharmacy, by P. C. Candidus; Past and Future, by W. F. Punch; Sulfonal, by J. W. Milner; Elective Affinity, by T. P. Boyd; Cutting on Patents, by J. D. Humphrey; and a very valuable monograph by Chas. Mohr on the Medicinal Plants of Alabama, of which a reprint has also been received. The antidote to the *cutting on the prices* of specialties recommended in Dr. Humphrey's paper is, perhaps, best explained in his own words, by quoting the following sentences: "I buy the very best drugs obtainable, put up my preparations in the same general style as similar patents are put up, but I do not steal the name or adopt the special style of package of any one. * * * While, of course, I lose the profits on what patents I sell, I make a fair margin on my own goods, and having a fair trade on these, I have about lost all interest in the silly war. * * * The success I have met with in my own goods causes me to wonder why it is that more of you do not put up your own preparations. Do not go to the 'non-secret' medicine man for your goods. * * * Really, if there is any difference it is in favor of the patents."

Connecticut.—Fourteenth annual meeting. pp. 108. See April number p. 200.—The next meeting will be held in New Haven, February 3 and 4, 1891.

Florida.—Fourth annual meeting. pp. 87. See June number, p. 311.—Among the papers read were the following: The medicinal properties of Florida plants, two papers by Dr. Meriwether and L. W. Cherry; Cornus florida, by H. C. Cushman; The Saw Palmetto, by J. M. Dixon.

Kansas.—Eleventh annual meeting. pp. 82. See July number, p. 374.—In addition to the papers mentioned before, the following were read at this meeting: Improvement in Tinctures, by H. W. Spangler; on Hydrocyanic acid, by Professor Sayre; and on the Metric system, by E. W. Barnes.

School of Pharmacy of the University of Michigan.—The annual commencement was held on June 26, and 32 candidates received the degree of Pharmaceutical Chemist. Commencement exercises were held, with those of other departments of the same institution, in University Hall, and ex-President A. D. White, of Cornell University, gave the oration. The annual meeting of the Pharmaceutical Alumni Society was held on June 25, and, after a dinner, an address was given by Dr. Chittick, of Detroit.

The Chicago College of Pharmacy closed its spring course during the past month. The commencement exercises were held at Hooley's Theatre, on the afternoon of July 28.

EDITORIALS.

American Pharmaceutical Association.—A circular issued by Professor Whelpley, Chairman of the section on scientific papers, gives the titles of the essays which have been promised for the approaching meeting of the American Pharmaceutical Association. It is well that the subjects to be brought forward become known beforehand, as thereby members will be the better enabled to participate in the discussions of matters, on which reports will be made. As far as furnished, the following essays will be laid before the meeting:

The Douglas spruce as a substitute for cork.

The Pacific Coast species of rhamnus.

American isinglass.

The medicinal plants of Florida.

The Florida phosphate deposits.

The active principle of arnica.

The manufacture of antiseptic dressings by the pharmacist.

Syrup of the hypophosphites.

The comparative value of yerba santa, liquorice and saccharin in masking the bitter taste of medicines.

Incompatibility of Fowler's solution with tincture of iron.

In addition to these several papers will be presented, containing statistical or pharmaceutical information on miscellaneous subjects.

A circular from F. B. Kilmer, Secretary of the section on commercial interests, states that the subject of "shorter hours" will, probably, be brought before that section, and invites an expression of opinion upon this question, from associations as well as from individuals.

The Committee on Arrangements, of which the Local Secretary, Mr. Charles E. Dohme, of Baltimore, is Chairman, has about completed the preliminary arrangements, of which the members will be informed by circular. The space for exhibits will be somewhat limited, and has nearly all been taken. The usual convention rates, one and one-third fare for the round trip, have been obtained; but since these tickets are good on the return trip only for a limited time, and are not available for stop-over, it is likely that most members from a distance will prefer the regular summer excursion tickets to Fortress Monroe or Old Point Comfort, which can be produced over numerous routes of travel, taking in many places of resort and interest.

As usual of recent years the first session will be called to order on Monday afternoon, at 3 P.M., and the last session will adjourn in the forenoon on the succeeding Friday. Propositions for membership should be sent to the Secretary of the Committee on Membership, G. W. Kennedy, Pottsville, Pa., as soon as possible, and credentials of delegates should reach the permanent Secretary early in August.

The Pharmaceutical Examining Board of Pennsylvania held an examination in the High School at Williamsport on July 8. The candidates for certificate of registered pharmacist were twenty-five, and for qualified assistant sixteen in number. Ten of each class were successful.

The Alvarenga Prize, of the College of Physicians of Philadelphia, consisting of one year's income of the bequest of the late Señor Alvarenga, of

Lisbon, has been awarded to Dr. R. W. Philip, of the Victoria Dispensary for Consumption and Diseases of the Chest, Edinburgh, for his essay on Pulmonary Tuberculosis, which will be published by the College.

The Sixth Centenary of the University of Montpellier was celebrated in that city in May last (see April number, p. 201), according to the programme previously arranged. We acknowledge the receipt of a pamphlet containing the discourses delivered on that occasion by the Rector, Professor Chancel, and by Professor Croiset, of the Faculty of Arts, the latter containing a historical review of the origin and growth of the University, and of the important events connected therewith during the six centuries of its educational labors.

The American Journal of the Medical Sciences.—We learn that with the completion of the July issue, Dr. I. Minis Hays has withdrawn from the editorship of the journal named, and that he will be succeeded in the editorial chair by Dr. Edward P. Davis. It does not frequently happen that a scientific journal of the standing and influence of the one named remains in the editorial care of father and son for sixty years, yet such has been the case with *The American Journal of the Medical Sciences.* The retiring editor has well succeeded in retaining for the *Journal* the high esteem of the medical profession, and in the hands of the new editor its reputation will, doubtless, not be permitted to decrease.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Practical Sanitary and Economic Cooking adapted to persons of moderate and small means. By Mrs. Mary Hinman Abel. Published by the American Public Health Association. 1890. 12mo. pp. 182. Price, cloth, 40 cents.

This is the Lomb prize essay for 1888, selected out of seventy presented for competition. The committee making the award consisted of Prof. C. A. Lindsley, New Haven; Prof. G. H. Rohé, Baltimore; Prof. V. C. Vaughan, Ann Arbor; Mrs. E. H. Richards, Boston, and Miss E. C. G. Polson, New Haven. In their final report the committee stated, "that of all the essays submitted the one selected is not only pre-eminently the best, but that it is also intrinsically an admirable treatise on the subject. It is simple and lucid in statement, methodical in arrangement and well adapted to the practical wants of the classes to which it is addressed. Whoever may read it can have confidence in the soundness of its teachings, and cannot fail to be instructed in the art of cooking by its plain precepts, founded as they are upon the correct application of the scientific principles of chemistry and physiology to the proper preparation of food for man."

The book may be procured from the Essay Department of the American Public Health Association, P. O. Drawer 289, Rochester, N. Y.

The Suppression of Consumption.—By G. W. Hambleton, M.D., President of the Polytechnic Physical Development Society of Great Britain. New York: N. D. C. Hodges. 1890. 12mo. Price, 40 cents.

This is the first number of a series of essays which are being published under the general title of "Fact and Theory Papers." The subject indicated in the title is treated of in a plain and convincing manner.